

THE SOUND OF MOOG: USING VINYL RECORDINGS TO RECONSTRUCT A HISTORY OF THE MOOG SYNTHESIZER

BY THOM HOLMES

Original vinyl recordings of popular music provide a rich source of data to supplement other historical research. Vintage recordings and associated liner notes provide details about the chronologic, geographic, biographic, and artistic elements that contribute to an understanding of music, music technology, and popular culture of the time. Information derived from a study of vinyl music recordings can fortify and supplement other forms of research in popular culture, artists, and music.

This report represents the initial findings of my *Sound of Moog* project to explore the influence of the early Moog Modular Synthesizer on popular music, culture, and industry. One aspect of this study is to archive every commercial recording made using the Moog Synthesizer between the years 1967 and 1970. The key aim behind this archive is to find out what can be learned about the history and influence of the instrument by examining recordings made by the early adopters of this technology.

In this report, I demonstrate various techniques for using vinyl recordings as a vital source of historical data and contemporaneous culture in the study of past music and related trends. I explore general methods of discographic practice in organizing data from vintage vinyl recordings, address the issue of dating popular music recordings, and illustrate that research derived from recordings adds unique findings and insight to historic research.

I have been collecting vinyl recordings of electronic and computer music since the 1960s. The goal of this ongoing endeavor is to archive vintage recordings of electronic music (1930 to 1985) that may be used as a resource by others, my eventual objective being to make the archive available to the public through an appropriate institution. This archive houses a broad spectrum of examples of electronic music from many countries, studios, and composers. From time to time, I focus on certain

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subsets within the archive. *The Sound of Moog* project seeks to supplement the known history of this instrument.¹

The history of the Moog Synthesizer has been documented in many ways. Inventor Robert Moog (1934–2005) was well-known, well-liked, and remarkably generous in making himself available to journalists, musicians, and music historians like myself who wanted to know more about the evolution of his invention. At least one documentary film was made about him, and several books touch upon his legacy to varying degrees.² His influence was significant on both the electronic music instrument industry and on the application of the music synthesizer by recording artists and music producers. But in researching Moog for my own work, and in the process of building an archive of recorded works of electronic music, I often failed to find answers to several basic questions. How many recordings were made with the Moog Modular Synthesizer? How many artists and producers used the instrument? In what genres of music was the Moog used? How many Moog Modular Synthesizers were installed and where were they located? Realizing that the best answers to these questions were simply educated guesses, I decided to devote some time to an exclusive study of commercial recordings of the Moog Modular Synthesizer.

BACKGROUND

Dr. Robert Moog, in his exceptionally understated manner, once said that he was merely an engineer, a toolmaker whose work only gained significance in the hands of musicians. In this gracious self-assessment he acknowledged the debt that he owed to musicians. Moog was not the first person to build a synthesizer, but he became the most recognized. The secret of Moog's success was that he listened to musicians, and solved the three most pressing challenges plaguing the use of synthesizers at that time: size, functionality, and control. Bob Moog's inventions even today are still widely regarded as the gold standard in electronic music instrumentation.

For this study, I am focusing on recordings made using the first generation of modular synthesizers created by Moog. The first three commercial models were offered for sale during the years 1967 to 1970.³ Invented

1. The project name, *The Sound of Moog*, is inspired by a promotional flexi disc—a thin sheet of flexible plastic cut with the grooves of a record, also known as a phonosheet—of the same name, produced by Moog Music Inc. in 1972 for demonstrating the sounds of the Minimoog.

2. See *Moog*, produced and directed by Hans Fjellestad, Plexifilm 018 (2005), DVD; Thom Holmes, *Electronic and Experimental Music: Technology, Music, and Culture*, 4th ed., with contributions by Terence M. Pender (New York: Routledge, 2012); Trevor Pinch and Frank Trocco, *Analog Days: The Invention and Impact of the Moog Synthesizer* (Cambridge, MA: Harvard University Press, 2002).

3. Although Moog's first sales of synthesizer modules began in 1964, units sold prior to 1967 were custom-configured to customer specifications. The catalog for 1965—a typewritten document on

by Dr. Robert A. Moog and produced by the R. A. Moog Company in Trumansburg, New York, the instrument was the first commercially successful electronic music synthesizer, and laid the foundation for a new market for electronic music instruments. As significant as this instrument was, to the best of my knowledge, no attempt has been made until now to systematically archive and assess a complete library of every commercial recording made with the Moog Modular Synthesizer during these formative years of the electronic music industry. One of the challenges I faced was that many of the early recorded appearances of the Moog synthesizer were not credited, requiring one to listen carefully to each and every recording for signs of the instrument. Fortunately, having been a Moog composer gives me direct experience with the kinds of sounds that could be made with the instrument.

My archive currently includes more than 235 unique, unduplicated recordings of the Moog Modular Synthesizer during the time frame of my study. This is a large number in comparison to other sources of which I am aware. By comparison, the Archive of Contemporary Music (ARC), a not-for-profit music library and research center located in New York City since 1985, currently lists only twenty-two unique recordings featuring the Moog from the years 1967 to 1970 among the more than 230,000 holdings that have already been indexed in its database.⁴ There are certainly special libraries, private collectors, and dealers who specialize in various aspects of electronic and popular music, but I have not yet found a collection with such a high concentration of Moog-specific recordings from this time frame. For example, the online resource Hyp Records has a Web page listing 225 LPs and singles described there as “Pop & Occult Moog LPs.”⁵ While very interesting, not all of these recordings feature a Moog synthesizer and only fifty-two of these are from 1967–70. Therefore, while recognizing that my search for additional recordings may never end, the rate at which I discover them has slowed considerably despite ongoing research. This suggests that the collection is reasonably complete. The term “modular” refers to the fact that these instruments were sold with a basic chassis, or cabinet, filled with a variety of modules selected by the purchaser. These modules contained the sound-generating, modulating, mixing, and control units used to create electronic music in the studio. Although each model began as a standard

letterhead—listed only individual modules for sale. The first three standard configurations were first publicized in a printed catalog dated 1967.

4. ARC contains more than 2.25 million sound recordings in total according to its director, Bob George. The ARChive collects, preserves and provides information on the popular music of all cultures and races throughout the world from 1950 to the present.

5. See <http://www.hipwax.com/music/oddpop/moog.html> (accessed 27 August 2014).

configuration, the size and specific modules of the instrument could be modified by the customer. There were studio models in walnut cabinets and, by 1969, a transportable version in rugged, hinged cabinets that could be folded and clasped shut. The basic modular synthesizer, with an organ-style keyboard, was programmed by connecting different modules via patch cords, and manually adjusting the settings for each module using switches and dials. It was monophonic—designed to play only one note at a time. If one wanted to play two notes at a time, e.g., play a chord, one had to do this through multitrack recording with a tape recorder, or by playing two keyboards or synthesizers at once. Unlike even the electric organ and later synthesizers, these modular instruments did not come with preset voices or sounds, nor was there a user manual. Creating sounds on the Moog required some basic understanding of audio physics and a lot of trial and error. It was commonly known that the “tuning” of the instrument’s oscillators could drift from day to day due primarily to temperature changes that affected the stability of the power supply and the output of the oscillators. As a result, tones and programming patches could change overnight in unpredictable ways, affecting the ability to reproduce the same sounds with regularity. From the standpoint of composing music, this often meant working fast and making recordings of everything as a safeguard. In 1972, Moog replaced the original oscillator module with a new one that he engineered to be more stable with temperature changes.

THE SOUND OF MOOG PROJECT

Commercial music recordings are a great source of data. They tell us about music and musical styles from a bygone era. In the case of the Moog synthesizer, recordings can also reveal other lesser known aspects of the instrument’s history, such as who used it, where, and for what purpose. Liner notes, although often sketchy, provide vital clues to the people, technology, and connections that became manifest through popular culture. Digging through this information, one begins to realize that sometimes the smallest of ideas, once used successfully—a piece of equipment, a musical idea, a style of production—can spawn many imitations and inspire more innovation. Such was the influence of the sound of Moog Modular Synthesizer. Once experienced, it posed many questions. What made that sound? Who manufactured the instrument? Where did the instrument come from? How is it played? Naturally this led to a cascade of accelerating innovation and imitators, both in the making of music and the making of synthesizers.

Scope of the Study

The recordings archived by *The Sound of Moog* study include every commercial LP recording of the Moog Modular Synthesizer from the years 1967 to 1970. The archive also includes many 7-inch, 45 rpm single recordings that either predate the album with which they are associated, or which never appeared on an LP. My cutoff date of 1970 marks the introduction of the Moog Minimoog synthesizer, whose sales skyrocketed in 1971 and soon eclipsed those of the modular system. The Minimoog was the first successful and relatively uncomplicated portable synthesizer. It required no patch cords, and was equipped with a selection of interesting preset sound choices. Once the Minimoog was available, the market for synthesizers grew exponentially, and so did the challenge for any writer, discographer, or researcher like myself to keep track of all of the recordings.

As an archival library of recordings—and due to the scarcity of many of these recordings—obtaining any copy in whatever condition has taken priority over collecting only first pressings in fine or mint condition. These recordings may be in any genre, from popular music to jazz, motion-picture soundtracks, classical, and avant garde. Although my collection contains some privately issued records and library recordings made for broadcast use, I have not included them in the study because they were not intended for the general public.

At the time of this writing, *The Sound of Moog* archive includes more than 200 recordings meeting the criteria described above. The rate at which I continue to discover additional recordings has slowed considerably, leading me to project that the archive, when completed, will include between 250 and 275 recordings in total. This number compares favorably with the recollection of musician Bernie Krause, who, along with his collaborator Paul Beaver, was responsible for programming and playing the Moog Synthesizer on the majority of these recordings made in the Los Angeles area, the melting pot of early Moog music.⁶

Discographic Approach

Viewed from the perspective of historical research, a core problem with studying popular music is that so many original vinyl recordings have been lost or poorly documented, having originally been overlooked by scholars. Making matters even more desperate is that many libraries, especially public libraries, have discarded their little-used vinyl record

6. Private correspondence with Bernie Krause, 15 August 2012.

collections and turntables in favor of digital collections. Replacing vinyl collections with CDs became standard procedure for many institutions during the 1990s.⁷ It is no surprise that those who study vintage popular music also happen to be record collectors.

Those of us who focus on the realm of popular music must often piece together information from a variety of sources to provide a reliable picture of the music, people, and record companies that produced popular music recordings. The job of documenting popular music has largely fallen to journalists, writers, collectors, musicians, and researchers in a variety of disciplines; “musicians who are not scholars, and scholars who are not musicians.”⁸ As a result, much of what is documented in the history of popular music is based on biographical notes, anecdotes, interviews and memoirs, encyclopedias of popular music, online music services, and reviews published at the time of a recording’s release. While all of these resources contribute mightily to understanding the influence and cultural significance of a given recording, substantial gaps remain in the discographic record unless one can obtain and assess the recordings themselves.

Having established a comprehensive collection of vintage electronic music recordings, I felt that the recordings themselves, along with their associated liner notes, provide a rich data source that can be explored to supplement the information derived from other traditional methods of research. If you consider these record albums as material culture in the anthropological sense, they can be studied for the purpose of informing us about many aspects of culture from their time. Whereas record collectors chiefly measure value by the scarcity, influence, and condition of a given recording, a study like mine that embraces the materiality of an object finds value not in the collectability of a record but in what the object tells us about the times in which it was created. In this case, these recordings help trace the history of a technology, its influence on musical ideas, and the formative stages of a new economy in electronic music instruments. Therefore, my goals in conducting this study have been to use the recordings to document aspects of the history of this instrument that have not been adequately addressed by other methods. My perspectives include:

- Chronological: a timeline of all recordings
- Geographical: detail the geographic distribution of the synthesizer as an indicator of industry growth

7. *A Basic Music Library: Essential Scores and Sound Recordings*, 3d ed., compiled by the Music Library Association, ed. Elizabeth Davis, et al. (Chicago: American Library Association, 1997).

8. James Patrick, “The Uses of Jazz Discography,” *Notes* 29, no. 1 (September 1972): 17–23.

- Biographical: identify those who used the Moog and their connections or mutual influences (e.g., artists, producers, and engineers)
- Artistic: measure the influence of the synthesizer in two ways: (1) its impact on different genres of music; and (2) the way in which it was used in music

The practice of discography naturally comes into play in documenting the essential reference information associated with a recording. I considered several widely used and standardized formats for discographies before settling on an approach that worked for my project.⁹ A few observations might be helpful.

The problems associated with standardizing discographies are well documented. At the opposite ends of the spectrum are two general approaches: the efforts of academic or *expert discographers*, and those of collectors and *musical specialists*. The work of the expert discographer begins with the concept of the discography itself, regardless of the kinds of recordings or genres of music involved. The second approach to discography stems from the work of a person whose activity as a musical specialist drives the individual to document a particular collection of recordings in a given genre or type of music or recording format. Fortunately, in practice, these two extremes overlap considerably in most cases so that discographies are often a crossover blend of fastidious consistency and an appreciation of the collectability and distinctive cultural value of a given recording. For this study, I want to begin by parsing the general tendencies of these two approaches so that the work I am conducting can be viewed in context.

The expert discographer is a research practitioner whose efforts are grounded in solid librarianship and a desire for standardization. A goal of this approach is to perfect a kind of method and layout for the collection and presentation of basic information related to an audio recording. And while there is no single standardized approach, there are many well-hewn practices in place. These discographers are rightfully concerned with defining the essential elements that belong in a discography, and providing a layout that is most helpful and accommodating to both the reader for reviewing the data and the discographer for collecting it.¹⁰

9. Tim Brooks, "Guidelines for Discographies in the ARSC Journal," *ARSC Journal* 37, no. 1 (Spring 2006): 14–20.

10. Examples of the historical debate over standards can be found in: Steve Smolian, "Standards for the Review of Discographic Works," *ARSC Journal* 7, no. 3 (1976): 47–55; Alan Kelly, John F. Perkins, and John Ward, "Discography: What Goals Are Attainable?" *Recorded Sound: Journal of the British Institute of Recorded Sound* 59 (July 1975): 453–55; Ida Rosen, "Report of the Education and Standards Committee," *ARSC Journal* 1, nos. 2–3 (Summer–Fall 1968): 4–47; Michael Gray and Gerald D. Gibson, *Bibliography of Discographies*, vol. 1: *Classical Music 1925–1975* (New York: Bowker, 1977), x; Jerome F. Weber, "Discography: A Plea for Rules," *Recorded Sound* 57–58 (January–April 1975): 380–82; Alan Kelly, John F. Perkins,

Expert discographers seek completeness and consistency in the data record, independent of the technology by which the data are assembled, and measure their achievements in comparison to other discographies.

Discographies created by the musical specialist can be quite a different beast entirely, often made out of a necessity to organize an available body of information, frequently for personal use, rather than a desire to conform to any existing discographic standard for wider distribution. Musical specialists are apt to adopt tools with which they are familiar for assembling a discography, often unaware of the standardized formats and methods used in academia. Still, there is so much overlap in the information elements required by both of these approaches that it seems reasonable to state that the most admirable discographies are often those produced by musical specialists who also adhere to the established practices and standards that came before them.

There are many challenges to creating discographies of popular music, not the least of which is understanding the difference between *collecting* and *creating a library*. I've been reminded of these differences by librarians who specialize in rare books. Is one's objective to collect first editions and other rare versions of every work, or to create a library consisting of at least one copy of each work, regardless of edition? The collecting of popular music recordings is similarly divided. From a scholarly point of view, discographies often focus on identifying the first recorded examples of a given piece of music, much like finding a first edition of a work of literature. In scholarly discographic work, establishing first-edition priorities is of utmost importance, including manufacturer, date of issue, country of issue, label (if different from manufacturer), serial number, matrix numbers, mode (monophonic, stereo), format (LP, 45, 4-track, 3-3/4 ips open reel, reel size, etc).¹¹ This approach proved useful for recordings of classical music and early popular music released on 78 rpm records, but became increasingly difficult—even impractical—for popular music after 1960 because of the sheer volume of record releases propagated in proportion to the explosive success of the music industry during that era. This volume of releases, reissues, and variations for dif-

and John Ward, "Discography: Which Goals Are Attainable?" *Recorded Sound* 59 (July 1975): 453–55; W. R. Moran, "Discography: Rules and Goals," *Recorded Sound* 66–67 (April–July 1977): 677–81; *Brian Rust's Guide to Discography*, Discographies, 4 (Westport, CT: Greenwood, 1980); Jerome F. Weber, "Clues to Composer Discography," *ARSC Journal* 15, nos. 2–3 (1983): 46–65; Tim Brooks, et al., "Formulating Guidelines for Discographies to be Published in the ARSC Journal," *ARSC Journal* 30, no. 2 (Fall 1999): 151–56 (report of a panel discussion on discographical standards held at the 1999 ARSC Conference); Tim Brooks, "Discographical Guidelines for the ARSC Journal: Identifying Sources in Discographies," *ARSC Journal* 31, no. 2 (Fall 2000): 276–81; George Creegan, "The Acoustic Recordings of Stephen Foster's Music," *ARSC Journal* 33, no. 2 (Fall 2002): 214–28; Jerome F. Weber, "Formulating Guidelines for Discographies to be Published in the ARSC Journal," *ARSC Journal* 28, no. 2 (Fall 1997): 198–208; Tim Brooks, "Current Bibliography," *ARSC Journal* 37, no. 1 (Spring 2006): 144–67.

11. Steve Smolian "New Beatles Discographies," *ARSC Journal* 8, nos. 2–3 (1976): 108–13.

ferent world markets made it difficult to nail down even the very basic details of a recording, such as when it was released, where it was made, who played on it, songwriting, cover art versions, and other credits.

What comprises the content of a discography has also changed with time. Past discographies primarily included only text, date, and numerical data. The ability to create archival quality reproductions of the vinyl recordings and associated cover art adds a welcomed multimedia aspect to modern discographic practice. For *The Sound of Moog*, I am including visual data as well as audio files representing each recorded track using the Moog. Therefore, I would describe my approach to discography as a hybrid of traditional expert practices and those of a musical specialist. The data elements and definitions associated with each entry in *The Sound of Moog* are listed in figure 1. Note some of the less common elements I have added to my discography, including additional people associated with each recording, the geography of the recording, the identification of the actual Moog instrument, the chronology of all recordings, current market value, a valuation for scarcity, audio files, and cover art, including liner notes.

What follows are some of the issues I have faced and solutions I have found in examining the chronologic, geographic, biographic, and artistic history of the Moog Modular Synthesizer and its vintage recordings.

Moog Recording Chronology 1967–1970

The question of dating a recording is important to placing it within historical context. The traditional discographer found the date of a recording session to be of more value than its release or issue date. This bias apparently stems from the days of 78 rpm recordings when a recording session was viewed as a performance event, and the recording only a reproduction of that event. Therefore, date priority was given to the date of the recording session rather than the release of a recording of the event at a later time.¹² This practice became less feasible as the nature of making a record evolved. No longer were recordings made in one take in real-time, but divided into multiple takes and sessions that were later mixed to produce the final recorded version of a work. What this suggests is that a recorded work was not considered finished until it was mixed and mastered for the final pressing onto vinyl. This is especially relevant to the use of the Moog Modular Synthesizer, which was almost always recorded later as a supplement to previously recorded instrumental tracks already laid down by musicians in the studio.

12. Gordon Stevenson, "Standards for Bibliographies of Discographies," *RQ* 15, no. 4 (Summer 1976): 309–16.

Rank and Scarcity

- *Summary descriptor*: Prominent one-word or short-phrase description summing up the recording. Could be musical (funky Moog, Moog country, spacey) or related to the importance of the record (historic, first, Beatles Moog).
- *Chronology rank*: A single number (0001, 0010, 0100, 1000) denoting the overall rank, in time, of each recording, as determined by my release date information
- *Current market value*: Based on *Popsike.com: Rare Records Auction Results* (mean average) or my own research
- *Scarcity*: Numeric value based on the number of times the title has been sold online (e.g., eBay, Discogs, GEMM) since 2004 (derived from *Popsike* and personal online research)

Rankings:

Rarest (1–10 sales)

Somewhat scarce (11–25 sales)

Plentiful (26+ sales)

Recording Credits

- *Title*: *The Zodiac Cosmic Sounds*
- *Artist(s)*: Main artist; if multiple, such as a soundtrack, main Moog artist(s)
- *Issue date*: Based on (1) Billboard; (2) U.S. Copyright Office; (3) other recording industry publications from the time; (4) firsthand accounts of those involved in making the record
- *Label and serial number*: Name of record label and the serial number as it appears on the record in my collection
- *Matrix numbers*: For both sides, shown as A: and B:
- *Session information*: Studio name(s) and recording dates, if known
- *Producer*: Producer of the recording
- *Engineer(s)*: Recording engineer(s)
- *Moog engineer(s)*: Person(s) responsible for programming the Moog, if noted as a separate credit

Fig. 1. *The Sound of Moog* Project—Fields and definitions for individual data records (approach and definitions ©2014 Thom Holmes)



The Sound of Moog

229

- *Moog performer(s)*: Artist(s) credited with playing the Moog, if known
- *Cover design*: Art director or other responsible for the cover design
- *Photography*: Photographer for liner photos, if known

The Moog

- *Moog ID*: Based on my timeline of ownership (AAA AAB AAC AAD), or best guess based on the producer, recording studio, engineer, and location
- *Moog location*: Location of the Moog instrument, by city

Moog Track(s)

- *Title*: "Title of Individual Moog Track"
- *Track no.*: Track side and number: A/01; B/01
- *Length*: Time of track; 01:01
- *What to listen for*: Short description of the track, indicating anything that characterizes it accurately (opening sound effects, rhythm bed, bass, solo, etc.). For an album with many or all tracks using Moog, a summary of the entire album could be provided as an alternative.

Visual Information

- *Front cover*
- *Back cover*
- *Inside covers, if gatefold*
- *Record labels*
- *Inserts*

Audio Information

- Each recorded track featuring the Moog Modular Synthesizer will be represented by a digital audio track mastered directly from the recording and stored on a reliable form of computer storage (currently high volume hard drives).

Fig. 1 (*continued*)



What, then, is a good method for dating popular music recordings? Two alternatives to using session dates are to use copyright dates or release dates.

Sound recordings were not granted federal copyright protection until the passage of the Sound Recording Act of 1971.¹³ You will therefore not find copyright dates for a sound recording made prior to 1971 unless, in certain select cases, the artist renewed the copyright and the original copyright date is still included in the listing. This occurs for only a small fraction of the recordings investigated, so therefore I regard the use of copyright as only a secondary dating technique for the time period 1967–1970.

Using release dates as a dating method proves to be a reasonable choice for recordings of popular music. I maintain that this solution has greater value within the context of popular-culture studies because it reflects the actual influence of a work once it has been released for general consumption. For those who argue that the date of a recording session should take priority, I reply that being the first to *record* a certain piece of music has no bearing on influencing culture until somebody has heard it. For these reasons, I am basing the chronology of my project on the release date as corroborated by industry media publications.

Establishing a reliable release date has its challenges. My goal has been to identify the release date for a recording down to the year, month, and day of issue. Obtaining the year of issue is easiest. Most, but not all records from this era listed a copyright/release year either on the printed jacket or the record label, but this was not a consistent industry practice. For example, Columbia Records discontinued printing copyright years on their LPs for several years around this time.

Obtaining the month and day of release is more difficult. I have found, however, that a viable alternative is to rely on music industry publications from the time as a fairly reliable source of release information. Thus far, I have been able to verify release dates for 87 percent of the recordings in my archive using this method. The most dependable source is *Billboard* magazine, which provided the majority of verifiable release dates. *Billboard* is the music industry magazine of record, published weekly since 1894. During the years 1967 to 1970, publication of *Billboard* was always on a Saturday, and fifty-two issues appeared each year. If a recording was not mentioned in *Billboard*, then I relied on several alternative music publications of the time, including *Melody Maker*,

13. For a summary of features of the law, see Maria Scheid, "Copyright Duration for Musical Compositions and Sound Recordings," Ohio State University Libraries Blogs (15 May 2013), <https://library.osu.edu/blogs/copyright/2013/05/15/198/> (accessed 27 August 2014).

Stereo Review, *Cashbox*, *High Fidelity*, *Jet*, and others featuring music charts or reviews of new releases. Furthermore, if I could not obtain a release date from music industry publications, I turned to the dates of record reviews found in newspapers and magazines, particularly the *New York Times*, *Los Angeles Times*, and *Boston Globe*.¹⁴ Incidentally, those doing research using online resources should be aware of the limitations of the *Billboard* back-issue database found on Google Books.¹⁵

Moog Geography 1967–1970

If there is a mantra that typifies my approach to finding recordings made with this synthesizer, it is to “follow the Moog.” My theory is that if I know where a Moog Modular Synthesizer was located, I can discover who made records with it. This has proven to be a fairly successful strategy, especially for recordings with uncredited Moog appearances.

To make it possible for me to “follow the Moog,” my first task was to develop an accurate list of known Moog Modular Synthesizer installations for the years 1967 to 1970. I used several sources and techniques to develop and vet this list. I began with a list of seventy-six known Moog sales from the files of the R. A. Moog Company, as provided by former Moog employee Roger Luther.¹⁶ I supplemented this list with research using several news, information, and magazine sources from the period, including: directories of worldwide recording studios; trade advertisements; articles about artists, studios, producers, trade shows, concerts, and interviews. I also relied on personal knowledge, contacts, and communications with artists and producers to verify additional Moog sites.

Based on this research, I have identified 195 worldwide locations of Moog Modular Synthesizers installed during the years 1964 to 1970. Although clearly an estimate, I believe that this number represents most, if not all, of the Moog installations of that time.¹⁷ Reasonable support for

14. *Billboard* and more than twenty-five additional U.S. and U.K. entertainment industry magazines can be searched using the *Entertainment Industry Magazine Archive* provided on paid subscription by ProQuest, <http://www.proquest.com/products-services/eima.html> (accessed 27 August 2014).

15. In 2009, Google Books underwrote the creation of an online archive of select *Billboard* back issues from the years 1940 to 2010. However, I learned from *Billboard* that Google made a decision to no longer support this project, and there is no plan to digitize the remaining issues. Of the 208 weekly issues of *Billboard* published from 1967 to 1970 (the range of my study), sixty-nine issues (33 percent) are missing from the online Google Books *Billboard* archive. The pattern of missing issues is irregular and most incomplete for 1969 and 1970, with 73 percent and 38 percent of the issues missing, respectively. As a result, using *Billboard* as a reliable source for dating records requires a combination of online retrieval and old-fashioned reading of microfilm or printed back issues in the library, which I have done. For my research, I have searched the complete back issues of *Billboard* using the online ProQuest *Entertainment Industry Magazine Archive*.

16. Roger Luther, Moog Archives, <http://moogarchives.com> (accessed 27 August 2014).

17. Basic shipping information was obtained from Roger Luther of the Moog Archives. I've supplemented this information with my own research.

this estimate can be extrapolated from published revenue figures for the company in 1970. Moog's stated sales revenue for 1970 was \$750,000.¹⁸ Given that my research shows that seventy-eight Moog Modular units were installed in 1970, this would suggest an average price for each system in the range of \$9,660 each, probably less if we assume that Moog's revenue consisted of more than just the cost of modular synthesizers alone (e.g., mixers, accessories, consulting, even early sales of the Minimoog). This places an average cost per system well within the publicly stated range of the instrument in 1970 of \$4,000 to \$10,000, "depending on the model."¹⁹

The geography of the Moog reveals some interesting demographics. Thirty percent of the Moog recordings made from 1967 to 1970 were made in Los Angeles, 25 percent in New York, and 5 percent in London. More than half of the recordings made in London were done using the Beatles' Moog at Abbey Road. As for the types of people and organizations who installed a Moog, the top user types included recording studios (44 percent) and universities (22 percent) followed by private musicians (14 percent) and advertising companies that produced musical jingles (11 percent).

Using location data found on the LPs was key to identifying the Moog instruments used for each recording. These data also allowed me to create a conceptual map showing the sequence and distribution of the Moog Modular Synthesizer over these formative years (see fig. 2).

BIOGRAPHICAL CONNECTIONS 1967–1970

Using information found on the record jackets and sleeves, I am able to knit together a network of people connections regarding the artists, engineers, producers, and even the graphic artists responsible for cover art or photos. What is most significant about these connections is that combining the geographic location of a Moog with those who used it, I am able to predict which recordings might include a Moog based on the associated artists, producers, engineers, and locations. This is enormously helpful in narrowing down my listening choices in trying to find uncredited cases of Moog Modular Synthesizer use.

Some interesting facts have emerged from this biographical research so far. Among them:

- Paul Beaver played on 30 percent of the Moog Modular recordings made during this period. He was based in Los Angeles and, with his

18. S. L., "The Vicissitudes of the Moog," *New York Times*, 23 April 1978.

19. "Music by Moog," *Boston Globe*, 8 February 1970.

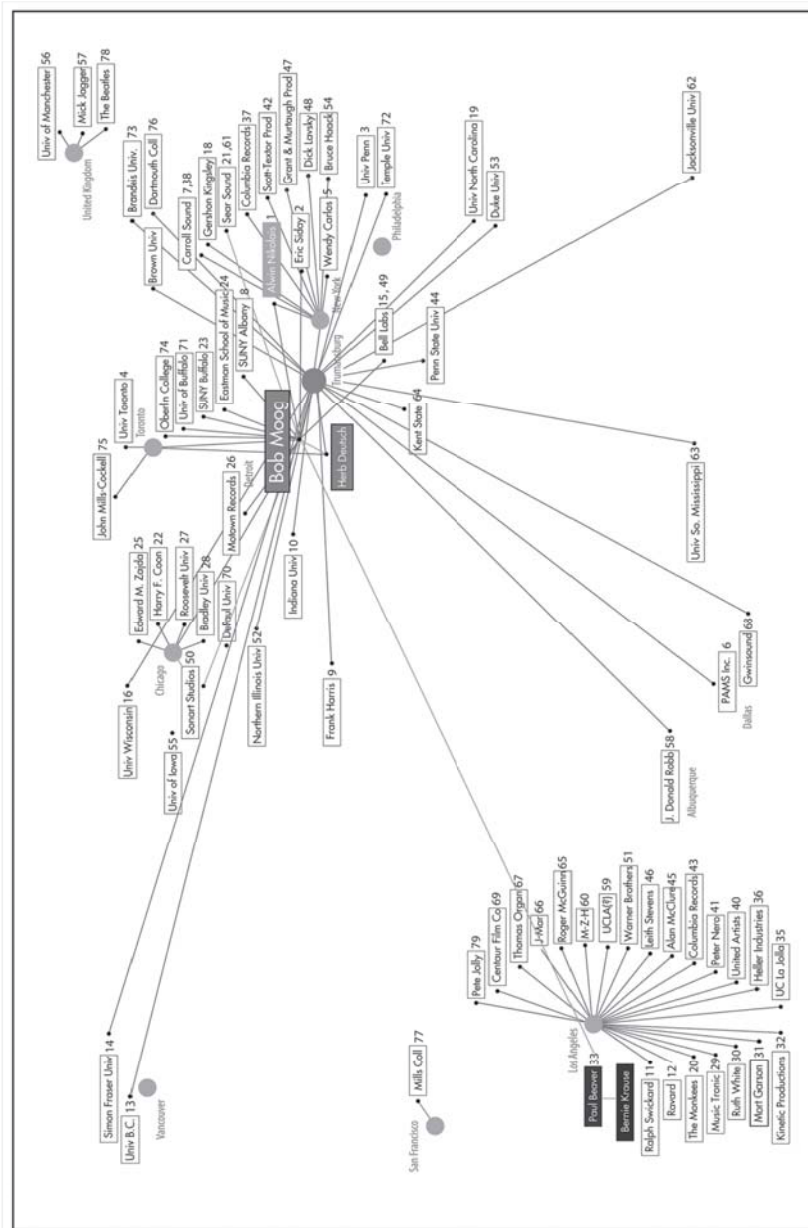


Fig. 2. The sequence and distribution of the Moog Modular Synthesizer, 1964–1970

associate Bernie Krause, were the first distributors of the Moog on the West Coast.

- The first rock group to use the Moog Modular was the Electric Flag, soon followed by the Doors, the Monkees, and the Byrds, all in late 1967.
- Jimi Hendrix bought a Moog Modular but apparently never used it on one of his own records. I continue to research this one!
- Mick Jagger owned a Moog but used it only for the movie *Performance*. It never appeared on a Rolling Stones record, and he sold the instrument to a German producer around 1971 who then sold it to Tangerine Dream.²⁰

Moog Artistry 1967–1970

From 1967 to 1970, the Moog Modular Synthesizer was used by an astounding array of artists in every major musical genre, and appeared on more than 200 commercial recordings. No major popular music genre was left untouched; recordings appeared by artists playing everything from space-age pop instrumentals to rock, soul, country, religious, movie soundtracks, musical theater, jazz, experimental electronic, and classical music.

The way in which the synthesizer was used varied widely from recording to recording. In many cases, the use of electronic music was little more than an afterthought, literally made possible by a chance visit by Bob Moog to a studio to demonstrate his instrument. In Los Angeles, where Paul Beaver and Bernie Krause represented the R. A. Moog Company, the duo was kept busy shuttling from recording studio to recording studio, setting up and playing the Moog several times a week. In several major cities, including Los Angeles, New York, Chicago, and Memphis, local music instrument suppliers rented Moogs by the hour and provided expert “programmers” to set up and play the complicated instrument. In each city, a growing cast of Moog engineers began to work with local recording artists to bring the sound of electronic music to popular culture. In addition to Beaver and Krause in Los Angeles, some of the most noted Moog engineers and players associated with recordings included Walter Sear and Bob Margouleff (New York), Eddie Higgins and Bob Schiff (Chicago), Rick Powell and Terry Manning (Memphis), and Mike Vickers (London), who taught the Beatles how to use the Moog for *Abbey Road*. But not all recorded performances of the Moog are credited. I currently estimate that about 25 percent of the

20. Tangerine Dream, http://www.tangerinedream-music.com/discography_long2.php (accessed 27 August 2014).



recordings I have identified are uncredited Moog appearances. But I do this cautiously because such telltale Moog sounds and processes are sometimes buried deep in the mix. I must draw the line if the sound that I hear is not clearly that of a Moog.

Another benefit of cataloging every use of the Moog on these early recordings is sorting out the various ways the Moog was used. These styles ranged from extremely trite novelty effects to complicated programming that formed the basis of entire works. I have also found that the use of the instrument in much popular music fell into a few unsurprising patterns:

- Novelty sounds at the opening of a song
- Background effects on a bed beneath the main instrumental tracks of a band
- A solo during an instrumental break
- Novelty sounds at the closing of a song

The Moog is often difficult to recognize on recordings, even when it is credited. Although the Doors were one of the first groups to use a Moog on an album (*Strange Days*, September 1967), they were so puzzled by what Paul Beaver demonstrated for them in the studio that all they used on the record was some voice modulation on the title track. Other groups, including the Monkees and the Byrds, were much bolder in their exploration of electronic textures on a few unique tracks that remain standout experiments with new sounds in the context of popular music.

CONCLUSION

Much can be learned about the history and influence of the Moog Modular Synthesizer by examining the recordings of the early adopters of this technology. Viewed from the standpoint of vintage commercial recordings, the chronological, geographical, biographical, and artistic history of the Moog Modular Synthesizer becomes much clearer and richer. Recordings provide direct evidence that this early music synthesizer was largely responsible for broadening the sound palette available to musicians, and the way that music could be produced using electronic means and control. The Moog Modular Synthesizer established the gold standard for conceptualizing and using electronic instrumentation. Early electronic music techniques established by the use of the Moog continue to influence the making of music today. Early recordings demonstrate the first diaspora of electronic music techniques throughout the many genres of popular music.

ABSTRACT

Original vinyl recordings of popular music provide a rich source of data to supplement other historical research. Vintage recordings and associated liner notes provide details about the chronologic, geographic, biographic, and artistic elements that contribute to an understanding of music, music technology, and popular culture of the time. Information derived from a study of vinyl music recordings can fortify and supplement other forms of research in popular culture, artists, and music. I have undertaken a project to archive every commercial recording made using the Moog Modular Synthesizer between the years 1967 and 1970. This study represents my initial findings regarding *The Sound of Moog* project, which focuses on the influence of this early synthesizer on popular music, culture, and industry. The central question behind my research is: What can we learn about the history and influence of the Moog Synthesizer by examining the recordings of the early adopters of this technology? In this study, I explore general methods of discographic practice in organizing data from vintage vinyl recordings, address the issue of dating popular music recordings, and illustrate that research derived from recordings adds unique findings and insight to historical research.